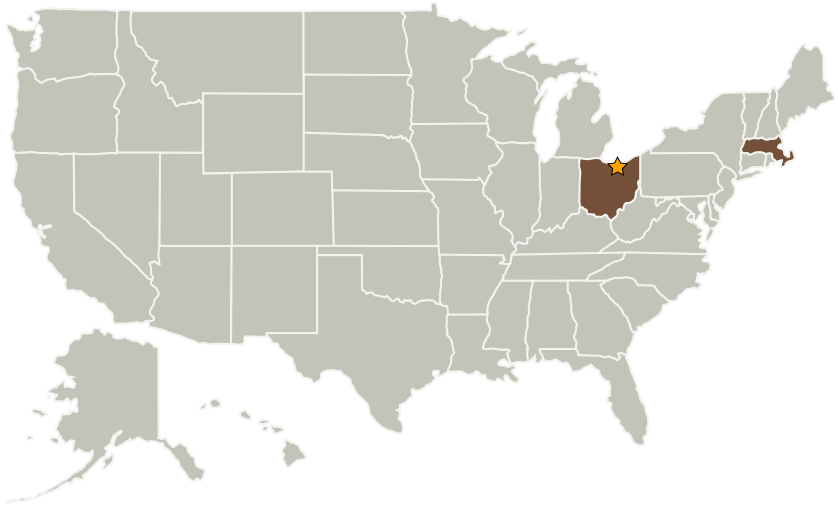
# Fiber Optic Continuous Liquid Sensor for Cryogenic Propellant Gauging, Phase I

Completed Technology Project (2009 - 2009)

## Project Introduction

Broadband Photonics Incorporated proposes to develop a patent-pending fiber optic continuous liquid sensor for low-thrust level settled mass gauging with measurement uncertainty <0.5% over fill levels from 2% to 98%. The fiber optic liquid sensor has significant advantages over the existing liquid sensors, including Delta-P pressure sensors, capacitance probes, ultrasonic sensors, and silicon diode point sensors in terms of gauging accuracy, reliability, simplicity, and maintenance. The proposed sensor is able to replace silicon diode point sensors currently used for propellant gauging without any modification on the tank. In Phase 1, we will prove the feasibility of the liquid sensor, including demonstration of 1 mm liquid level spatial resolution and development of the robust sensing fiber for cryogenic temperature applications. In Phase 2, we will further develop the prototype of the fiber optic liquid sensor.

## Primary U.S. Work Locations and Key Partners

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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Glenn Research Center (GRC)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| ★Glenn Research Center(GRC) | Lead Organization | NASA Center | Cleveland, Ohio |
| Broadband Photonics Incorporated | Supporting Organization | Industry<br>Minority-Owned Business, Small Disadvantaged Business (SDB) | Winchester, Massachusetts |

| Primary U.S. Work Locations | |
|---|---|
| Massachusetts | Ohio |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.5 Electromagnetic Wave Based Sensors